

REMARKS

This application has been carefully reviewed in light of the Office Action mailed on February 27, 2003. Claim 125 has been amended. A marked-up version of this claim, showing changes made, is attached hereto as Appendix A. Claim 60 has been canceled. Claim 126 has been added. Claims 55, 57, 58 and 124-126 are now pending. Reconsideration of the above-referenced application in light of the amendments and following remarks is requested.

At the outset, Applicants acknowledge with appreciation that claim 124 is in condition for allowance.

Claim 60 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 60 has been canceled. Accordingly, this rejection is now moot.

Claims 55 and 57 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Okutoh et al. (U.S. Patent No. 6,180,974) (“Okutoh I”). Reconsideration is respectfully requested.

The Office Action asserts that Okutoh I teaches “a non-oxide layer 230 comprising platinum material on top of the platinum-rhodium layer.” (Office Action, pg. 3). Applicants respectfully disagree. In fact, Applicants respectfully submit that Okutoh I teaches an oxide layer rather than a non-oxide layer as Applicants claim. Okutoh I does not teach a memory cell with “a non-oxide layer comprising platinum material on top of the platinum-rhodium layer,” as claim 55 recites.

In Okutoh I, a platinum-rhodium layer is provided with at least a platinum-rhodium oxide layer on top (Figs. 6-8). Further, in Fig. 5, Okutoh I suggests a platinum-rhodium oxide layer with a ferroelectric film such as PZT on top rather than a platinum comprising material.

Accordingly, Okutoh I fails to suggest or teach the limitations of claim 55. In particular, providing “a non-oxide layer comprising platinum material on top of the platinum-rhodium layer,” as recited in claim 55 (emphasis added). Claim 57 depends from and incorporates all of the limitations found in independent claim 55 and is at least allowable for the reasons set forth above with regard to claim 55. Accordingly, the rejection of claims 55 and 57 is solicited.

Claims 55 and 57 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Okutoh et al. (U.S. Patent No. 6,201,271) (“Okutoh II”). Reconsideration is respectfully requested.

The Office Action asserts that Okutoh II teaches “a non-oxide layer 22 comprising platinum material on top of the platinum-rhodium layer.” (Office Action, pg. 4). Applicants respectfully disagree. In fact, Applicants respectfully submit that Okutoh II teaches an oxide layer rather than a non-oxide layer as Applicants claim. Okutoh II does not teach a memory cell with “a non-oxide layer comprising platinum material on top of the platinum-rhodium layer,” as claim 55 recites.

Okutoh II states that an “alloy oxide film of platinum and rhodium is formed as an upper electrode so as to be put in direct contact with a ferroelectric PZT film.” (Abstract) (emphasis added). Okutoh II teaches that “[t]he elemental composition ratio of the alloy oxide film of platinum and rhodium was expressed by the ratio of platinum:rhodium:oxygen=70:15:15,” (Col. 9, lines 2-5). Further, a titanium nitride film 16 is placed on top of the platinum-rhodium layer and not a layer comprising platinum.

Accordingly, Okutoh II fails to suggest or teach the limitations of claim 55. In particular, providing “a non-oxide layer comprising platinum material on top of the platinum-rhodium layer,” as recited in claim 55. Claim 57 depends from and incorporates all of the limitations found in independent claim 55 and is at least allowable for the reasons set forth above with regard to claim 55. Accordingly, the rejection of claims 55 and 57 is solicited.

Claims 58 and 60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Okutoh II. Reconsideration is respectfully requested.

Claim 58 depends from and incorporates all of the limitations found in independent claim 55 and is at least allowable for the reasons set forth above regarding Okutoh II with regard to claim 55. In particular, Okutoh II does not teach or suggest a memory cell with “a non-oxide layer comprising platinum material on top of the platinum-rhodium layer,” as claim 55 recites.

The Office Action asserts that “it is a matter of design choice within the skills of an artisan, subject to routine experimentation and optimization,” and thus, the claimed thickness of the platinum layer is rendered obvious therefrom. Applicants respectfully disagree. Okutoh II specifically teaches forming the platinum layer 10 “to a film thickness of 1000 Angstroms as a lower electrode.” (Col. 5, lines 53-54). There is no teaching or motivation in Okutoh II to form a platinum layer within Applicants’ claimed range, and is a significant order of magnitude less than what Okutoh II specifically discloses. Accordingly, Okutoh II does not teach or suggest a platinum layer that “has a thickness within the range of about 50 to about 150 Angstroms,” as claim 58 recites. This is an additional reason for the allowance of claim 58.

Claim 125 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Okutoh II in view of Dornfest. Reconsideration is respectfully requested.

The Office Action asserts that it would have been obvious to substitute the titanium layer in Okutoh II for the titanium nitride layer taught in Dornfest. Applicants respectfully disagree. Okutoh II already provides a titanium nitride film 16 “that serves as an adhesion layer and an antireflection film,” (FIG. 8 and Col. 5, lines 23-25). Further, a second titanium nitride film 9 is a “diffusion barrier layer,” (FIG. 1 and Col. 5, lines 14-15).

There is no motivation to substitute Okutoh II's titanium layer with Dornfest's titanium nitride layer since Okutoh II already teaches a diffusion barrier layer that consists of titanium nitride on top of the titanium layer. Accordingly, the cited references do not teach or suggest, "a capacitor comprising an electrode having a titanium nitride layer provided beneath a platinum-rhodium layer and a platinum layer on top of the platinum-rhodium layer," as recited in claim 125.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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APPENDIX A

125. (amended) A memory cell, comprising:

a substrate;

a transistor including a gate on said substrate and a source/drain region in said substrate disposed adjacent to said gate;

a capacitor comprising an electrode having a titanium nitride layer provided beneath a platinum-rhodium layer and a platinum layer on top of the platinum-rhodium layer[, wherein the titanium nitride layer is from about 100 to about 150 Angstroms thick]; and

a conductive plug providing electrical contact between the source/drain region and the lateral surface of the electrode.